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| 10/596,051 | 05/26/2006 | Toru Takenaka | SAT-16655 | 1188 |

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| EXAMINER | |
|---|---|
| PAUL, ANTONY M | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/596,051 | TAKENAKA ET AL. | |
| | Examiner | Art Unit | |
| | ANTONY M. PAUL | 2837 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *30 April 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-5* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4 and 5* is/are rejected.

7)☒ Claim(s) *3* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 June 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *06/19/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### Claim Rejections 35 USC§ 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-2, 4 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Takenaka et al. (5,432,417).

In regard to claims 1 and 2, Takenaka et al. disclose in fig.1 a control system for a legged mobile robot (column 1, lines 7-10) comprising a base body [24], a plurality of link mechanisms such as thigh links [32R, 32L] connected to the base body [24] to move the base body (walk, column 1, line 9, column 4, lines 10-16) and that come in contact with externals such as ground (figs.5-6, column 4, lines 33-37) and a plurality of joints [10R, 10L] (column 3, lines 50-68, column 4, lines 1-9) provided between base body [24] and distal portions such as foot members [22R, 22L] of the link mechanisms [32R, 32L] to make the distal portions [22R, 22L] of the link mechanisms [32R, 32L] movable (locomotion, column 4, lines 1-15) with respect to the base body [24], The legged mobile robot operated (motors, column 3, lines 54-58) to a specific motion posture (walk, figs. 6A-D) in which the robot is in contact with an external such as ground (fig.5) at predetermined portions such as portions of foot members [22R, 22L] (figs.5-6, predefined, see column 10, lines 25-34, column 14, lines 47-50, predetermined, see column 17, lines 60-66) between the distal portions such as foot portions [22R, 22L] of one or more specific link mechanisms [32 R, 32L] among the plurality of link mechanisms [32R, 32L, 34R, 34L] and the base body [24], the control system [26] comprising:

An external force detecting means [36] (sensor, column 4, lines 24-37), a desired external force determining means for determining a desired external force (figs.5-6, column 5, lines 45-53, column 6, lines 1-8, 52-63, column 11, lines 29-30), which is a desired value (such as a target value P', see figs 5-6, column 5, lines 45-59, column 10, lines 1-3) of the external force(ground reaction force, fig.5) on the predetermined portion in the specific motion posture (such as walking pattern, figs 5-6) and

A joint controlling means [26] (column 4, lines 48-68, column 7, lines 68, column 8, line 1, see fig.3 step 26) for controlling the displacement of a t least a joint (rotation, column 1, lines 55- 68, column 4, lines 1-9) existing between the predetermined portion such as foot portion [22R, 22L], fig.1) and the base body [24] such that the detected external force [P] approximates the desired external force [P'] (figs 5-6, column 5, lines 33-68, column 6, lines 1-8, column 6, lines 64-68, column 7, lines 1-24, column 13, lines 23-26, fig.14).

The newly added limitation does not further limit the base claim because a robot of fig.1 shows one or more distal portions such as foot portion (22R, 22L)) contacting the external such as ground (fig.5).

A first predetermined portion such as a hip joint [12R/12L or 14R/14L or 16R/16L) is between the distal portion [22R, 22L] of one specific link mechanisms such as thigh joints [32R, 32L] or ankle joints [34R, 34L] and the base body [24], wherein the distal portion of the link mechanism is a portion to be in contact with the external for moving the base body, and the first predetermined portion is a portion not to be in contact with the external for moving the base body (foot [22R, 22L] contact the ground to move the body [24] of a robot [1]. Hip joints [12R/12L or 14R/14L] of robot [1] do not contact the ground and also is a predetermined portion because acceleration and position of hips are determined to produce the walking pattern of said robot [1] (column 5, lines 1-29, target angles calculated for joints, see column 7, lines 55-62, column 8, lines 63-68 and column 9, lines 1-6).

In regard to claim 4, Takenaka et al. disclose in fig.1 a control system [26] for a mobile robot comprising an actual posture detecting means [36] (fig.4, step 100 and

102, see figs 5-6) for detecting the actual posture [P] of a second predetermined portion such as the base body (such as the base of a foot RFFV connecting a body [24], see figs. 5-6, column 5, lines 35-53) of the mobile robot (fig.1) and a desired motion determining means (target, column 5, lines 45-53, column 6, lines 1-8, 52-63, column 11, lines 29-30, see figs.5-6) for determining a desired posture [P'] of the second predetermined portion [RFFV] wherein the desired external force determining means (see explanation in claim 1) determines the desired external force on the basis of at least the difference between the actual posture [P] and the desired posture [P'] of the second predetermined portion [RFFV] (see column 6, lines 52-68, column 7, lines 1-25 and column 9, lines 50- 62, se figs. 13 &14).

In regard to claim 5, Takenaka et al. disclose in figs.1, 5-6 a control system [26] for a mobile robot, wherein the joint controlling means [26] (see explanation in claim 1) comprises a means for determining the manipulated variable (such as a position P) of an external force such as ground reaction force (fig.5) on the basis of the difference between the actual posture [P] and the desired posture [P'] (the limitations are explained in claim 4 above). The detected force [P] (actual force, fig.5) approximates the desired external force [P'] (fig.5, column 5, lines 35-68 & column 6, lines 1-8).

**Allowable Subject matter**

3. Claim 3 is allowed.

4. Claim 3 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

5. The following is a statement of reasons for the indication of allowable subject matter: The limitation, "wherein the specific link mechanisms are leg bodies extended from buttocks connected to the base body through the intermediary of joints, and the first .predetermined portion is the buttocks" Is not taught by Takenaka et al.

**Response to Arguments**

Applicant argue that Takenaka et al. does not teach "the legged mobile robot being able to be operated to a specific motion posture in which the robot is in contact with an external at one or more distal portions of the link mechanisms and a first predetermined portion or portions between the distal portion or portions of one or more specific link mechanisms among the plurality of link mechanisms and the base body, wherein the distal portion of the link mechanism is a portion to be in contact with the external for moving the base body, and the first predetermined portion is a portion not to be in contact with the external for moving the base body, the control system, comprising: an external force detecting means for detecting or estimating an external force acting on the first predetermined portion in the specific motion posture.

Applicant teaches one of the distal portions as feet of legs (see specification, page 12, lines 20-22). Takenaka et al. teaches in figs 1, 5 & 6 where in a robot [1] has a foot portion [22R, 22L] contacting the ground. Prior art also teaches calculation of acceleration, position, joint angles, rotation associated with hip joints such as [12R/12L or 14R/14L or 16R/16L), which are not in contact with the ground as in fig.1 (column 3, lines 50-68, compute target joint angles, see column 4, lines 1-68, column 5, lines 1-29, column 7, lines 55-62, column 8, lines 63-68 and column 9, lines 1-6).

Takenaka et al. teaches force and torque sensor [36] that sense the reaction force of foot [12R, 12L], wherein each feet [12R or 12L] have a predetermined portion such as a target position calculated (see figs 3-8) based on various other predetermined calculations such joint angles, position, acceleration, rotation of hip joints as explained above. In general when a person stands on the ground, ground reaction forces not only affect the feet portion, but also the joints connected to the foot. Therefore for independent claim 1, the newly added limitations does not overcome the prior art teaching.

Applicant also argue that Takenaka et al. does not disclose or suggest a condition where the control system controls the stability of the robot when other portions of the robot, such as for example, knees, elbows, the trunk, the buttocks, etc. contact

the ground (These limitations are not explicitly claimed in claim 1). Nor does Takenaka disclose or suggest that the control system can maintain the robot in a stable posture when the robot moves from one posture to another posture.

Figs 5-6 shows foot positions of a robot being controlled and correction is made based on the foot position error [X]. Therefore various walking pattern of robot [1] is error corrected depending on the location such as terrain (column 6, lines 9-29), foot position, distance (column 7, lines 1-54) and various other factors such as tilt angle of the upper body (tilt angle proportional to error, column 6, lines 31-37). The predetermined portions such as target angles of joints are calculated based on foot positions (column 7, line s 55-68 and column 8, line 1).

Examiner is confused with the phrase (see remarks, , "As explained above, in the present invention the control system controls the stability of the robot when the distal portion is in contact with an external and when the first predetermined portion is in contact with an external", which conflict with the limitation of claim 1. Claim 1 teaches a first predetermined portion not in contact with the external for moving the base body.

Therefore the control system of robot of Takenaka et al. provides and maintains stability irrespective of irregularities in the terrain and ground reaction forces (see column 1, lines 22-60).

**Information disclosure Statement**

Examiner acknowledges the receipt of international search report received on 01/31/2008 and foreign references received on 06/19/2006.

**Conclusion**

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANTONY M. PAUL whose telephone number is (571)270-1608. The examiner can normally be reached on Mon - Fri, 7:30 to 5, Alt. Fri, East.Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benson Walter can be reached on (571) 272-2227. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Antony M Paul/
Examiner, Art Unit 2837 08/18/2008

/Walter Benson/
Supervisory Patent Examiner, Art Unit 2837